

the case of vitamin K the most common cause of deficiency of this factor is the existence of a syndrome associated with impaired lipid ingestion and absorption. Examples are obstructive biliary disease or widespread malabsorption, such as in sprue or celiac disease. Another clinical event relating to vitamin K deficiency is the result that occurs after prolonged oral therapy with drugs (such as sulfaguanidine or succinylsulfathiazole) capable of suppressing vitamin K-producing bacteria.

I think it must be observed that the difference of opinion manifested in the article and Dr. Erhardt's letter are, as is not infrequently the case, mainly due to faulty communication and failure to be specific about the ability of vitamins to be obtained in some instances from other than dietary sources.

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Management of Tetanus

TO THE EDITOR: We share Dr. Herbert Webb's concern for the respiratory care of patients with tetanus (Henderson DK, Tillman DB, Webb HH, et al: Infectious disease emergencies: The clostridial syndromes—Teaching Conference, University of California, Los Angeles and Harbor General Hospital, Torrance [Specialty Conference]. *West J Med* 129:101-120, Aug 1978). However, we disagree with the suggested management in several areas.

Dr. Webb advocates the use of diazepam as the preferred agent to facilitate intubation should sudden airway obstruction due to laryngeal spasm occur. We suggest that succinylcholine, administered intravenously in a dose of 1 mg per kg of body weight, will relieve laryngeal spasm and provide optimal relaxation for intubation in this situation. Since the condition of virtually all patients with tetanus will deteriorate after initial diagnosis and their admission to the hospital, we would elect the following course of airway management: nasotracheal intubation after the first muscle spasm, and then assessment over the next several days to determine ultimate severity of the disease and the possible need for long-term airway management with tracheostomy. Modern endotracheal tubes using a high volume, low pressure cuff may be left in place for two weeks or longer; the incidence of complications associ-

ated with their use is no greater than that seen with the use of a tracheostomy tube and there is much less of an operative hazard. For those who elect a more conservative early course of airway management, a laryngoscope, an endotracheal tube and succinylcholine should be kept at the bedside; personnel familiar with their use must be immediately available should laryngeal spasm occur.

We would also question Dr. Webb's use of the sigh in mechanically ventilated patients in whom 12 to 15 ml per kg of body weight tidal volumes are used. Such maneuvers cause very high inflation pressures to be generated with a consequent higher risk of pulmonary barotrauma; maintenance of optimal functional residual capacity (FRC) can be more easily obtained, and with less risk, by maintaining minimal levels of end-expiratory pressure. Sighs have not been found helpful in maintaining optimal FRC in paralyzed patients ventilated with tidal volumes of 12 to 15 ml per kg.

For patients with severe tetanus where paralysis becomes necessary to control muscle spasms, d-tubocurarine has long been the mainstay of nondepolarizing blocking agents used. It may cause hypotension, however, by histamine release and ganglionic blocking. It has recently been shown that metocurine (Metubine®) lacks this hypotensive effect while producing muscle paralysis.¹ This agent, then, might be a better choice than d-tubocurarine in producing long-term paralysis in these patients.

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Dr. Webb Replies

TO THE EDITOR: I think it is important to respond to several of the comments made by Drs. Alfery and Rauscher. Actually, I did not advocate the use of diazepam as the preferred agent to facilitate intubation and the setting of laryngeal spasm in tetanus. I did say that it was crucial to use "a paralytic agent or muscle relaxant (preferably diazepam)." I have found diazepam to be quite adequate on several occasions in the setting of laryngeal spasm in tetanus. It is true that succinyl-

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choline is accepted as the agent of choice for a paralytic agent needed for immediate onset of action. However, I have been hesitant to advocate its use in tetanus because of its widely known complication of hyperkalemia in the presence of muscle trauma and numerous neuromuscular diseases.^{1,2} It has been stated that significant hyperkalemia can occur after succinylcholine in tetanus,³ but I cannot find good documentation of this. Succinylcholine was used to manage one patient with tetanus requiring paralytic therapy but serum potassium values were not assessed.⁴ My recommendation is to give diazepam intravenously in a large dose and if this is not successful in facilitating intubation, to proceed rapidly to the use of succinylcholine as recommended by Alfery and Rauscher, and to be aware of the possibility of acute and clinically significant hyperkalemia.

Experience in tetanus has shown that not all patients require an aggressive early course of airway management with nasotracheal intubation but certainly I agree with the caveat that if conservative early airway management is elected, the patient must be carefully observed, an intravenous infusion line should be ready and succinylcholine, diazepam, and personnel and equipment for immediate airway control should be available.

Tidal volumes of 10 to 15 ml per kg of body weight do not cause "very high inflation pressures" in patients with normal lung compliance and are rather routine in many respiratory care centers for both paralyzed patients and others and have been found to maintain adequate functional residual capacity without the use of sighs in numerous patients. However, in totally paralyzed patients many of us still use deep sighs to rejuvenate surfactant and help to prevent diffuse microatelectasis which otherwise occurs. I have not routinely used positive end-expiratory pressure in paralyzed patients because of the high incidence of thromboembolic complications in these patients even without the use of positive end-expiratory pressure which may itself predispose to that problem. This seems to be particularly relevant to patients with tetanus as indicated in my discussion.

Although d-tubocurarine has been widely used as a paralytic agent in many forms of respiratory failure and in tetanus, pancuronium is probably a better agent because of its ease of use and essential freedom from complications including

hypotension which d-tubocurarine may cause as indicated by Drs. Alfery and Rauscher. In essence, I agree with them that it should not be used in tetanus for the reason they state, especially since autonomic insufficiency and hypotension are not infrequent problems in patients with tetanus. I see little reason to use metocurine in place of pancuronium which has now had extensive clinical experience.⁵

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Prevalence of Amebiasis

TO THE EDITOR: In the September issue of the journal (*West J Med* 129:241-242, 1978) Dr. Edward Markell made a spirited attack on my position that endemic amebiasis must be quite uncommon, although it is a problem with travelers and in the homosexual community.

I called Dr. Markell, who proved to be a gracious and learned gentleman, and we were able to resolve most of our differences. Both agree that we found amebae in one to two percent of submitted specimens during the past year (actually 1.1 percent for Valley Memorial Hospital, Livermore, California and 1.7 percent for Kaiser-Permanente Medical Center, Oakland, California). Interestingly, we each found exactly 4 percent of specimens positive for *Giardia*. My interpretation of this is that Dr. Markell's astute clinicians and competent technologists are detecting most of the amebiasis in the Kaiser-Permanente medical population, giving about 100 to 150 cases per year in a population of about 750,000, a rate similar to my previous speculation.

Dr. Markell, on the other hand, thinks that sampling a healthy population would yield nearly the same percentage of positives. He has some basis for his opinion, as he did some unpublished work on Navy personnel that showed a significant asymptomatic prevalence, and also found a num-